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Drivers Drowsiness and Alcohol Detection with Alarm System

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ABSTRACT: The main objective of this project is to alert and avoid road accidents which are occurred due to negligence of driver not wearing the seat belt, drunk and drive and drowsiness due to fatigue. This might cause severe major accidents and often results in death. The drivers drowsiness and alcohol detection with alarm system consists of alcoholic sensor, Raspberry pi, seat belt sensor, gps and pi camera. The alcohol sensor detects alcohol and alerts the driver by using buzzer and stops the engine until the driver restarts the car again. The same process will happen if the driver do not wear seat belt and it is detected by using seat belt sensor. The major cause of accidents is drowsiness and it can be detected by using pi camera and same process happens as in the cases alcohol detection and not wearing seat belt. This information is given to the authorized person by using thing speak cloud and vehicle location by using gps.

KEYWORDS: Alcohol detection, drowsiness detection, Raspberry pi, smart alarm system, seatbelt wearing detection.

I. INTRODUCTION

Drowsy driving or sleep-deprived driving occurs when a person operating the wheel is too tired to remain fully conscious and handle the wheel. This could lead to slower reaction timing and the driver might fall asleep. According to research, drowsy driving is riskier than texting while driving, distracted driving, or intoxicated driving combined. In 2017, 1,47,913 people were killed in road accidents, according to data released by the ministry of road transport and highways. According to statistics, drivers with a reduced level of vigilance are responsible for 10% to 20% of all traffic incidents. According to reports, 60 percent of adult drivers drove a car while drowsy in the year 2017-18. It is observed that young people aged 18 to 29 are the most vulnerable to sleep-related accidents. Each year, the National Highway Traffic Safety Administration estimates that driver fatigue causes around 100,000 accidents. One might face difficulty maintaining proper speed when drowsy driving. It is difficult to stay fully aware and the driver might slip into a brief state of unconsciousness. Sleep deprivation accounts for the majority of cases of drowsy driving affecting the driver's ability to pay less attention to roads. This, drowsy driving may happen due to various reasons such as sleeping disorder, alcohol consumptions and the time of the day, etc. One of the most common symptoms of fatigue is the drooping of eyes. Sleepiness causes the eyelids to become heavier and thus droop. This might lead to the driver falling asleep completely. Some visible symptoms of drowsiness include frequent yawning, increased blinking rate, and difficulty concentrating. When a driver's exhaustion level increases, so do their ability to steer. As a result, the negative impact of fatigue on driving efficiency emphasizes the significance of early fatigue identification.

This paper focuses on providing a radical solution to this problem. We use CV tools to identify facial landmarks and then extract facial signals that indicate drowsiness. Since eyes are one the most salient features that reflect one's current state, we use eyelids' drooping and excessive blinking as one the factors to predict drowsiness. We do so by adaptable Eye Aspect Ratio (EAR). Moreover, we also use the movements of the lips to detect fatigue using the Mouth Aspect Ratio (MAR) and counting and keeping a count of frequent yawns. Thus, the goal of this paper is to propose a system that monitors human operator's vigilance and warns them the risk of accidents.

The Indian Ministry of Statistics reported thousands of road accidents in 2016. Though the report

declared speed violation is the foremost reason for these accidents, it will safely be inferred that almost all of the cases are because of driver's unstable condition caused by drivers becoming drunk before they drive. The investigation done by the Planet Health Organization in 2008 shows that concerning 50%-60% of traffic accidents square measure associated with drink-driving. Moreover, WHO information on road traffic deaths disclosed 1.25 million traffic deaths were recorded globally in 2013 with the low- and middle-income countries having higher fatality rates per a 100K population (24.1% and 18.4% respectively), information collected showed that several of economic vehicles drivers in Bharat admitted to drinking alcohol throughout operating days. This shows that almost all drivers, particularly business and serious duty trucks drivers interact in drink-driving, which may result in accident. Bharat sets a legal limit of 30mg/100mL blood alcohol concentration (BAC), any level higher than that's same to be ineligible. The BAC depicts the amount of alcohol in an exceedingly sure volume of blood. It's measured as either grams of alcohol per metric capacity unit of blood or milli litres of blood, (mg/ml, utilized in a lot of Europe). For BAC level from 0.4 to 0.6, drivers feel dazed/confused or otherwise disoriented, and it's typically not safe for a driver to drive a vehicle beneath such condition. Also, BAC level for 0.7 to 0.8 makes a driver's mental, physical and sensory functions to be severely impaired. At this stage, a driver is inactive and incapable of driving. BAC level of 0.2 to 0.3 continues to be not safe however the motive force still. So, there is need of such system which can reduce the number of road accidents caused due to drunk driving.

Seatbelt is must for the driver during driving because in case of accident it protects the driver from worst injuries but we can find most of the accidents, the drivers are not wearing seat belt. so, to avoid these kinds of situations in our project we introduce seat belt alarm system that is in case driver or passengers are not wearing seatbelt then alarm will alert the driver and in case the driver is not followed warning then engine maynot star..

II. LITERATURE SERVEY

In recent times, computer vision-based diagnosis using image processing-based solutions have become increasingly popular. Research towards driver monitoring has gained momentum, especially for driver workload estimation, driver identification, secondary task identification, and driving style recognition. Possible techniques for detecting driver's drowsiness can be divided into two categories: Methods based on visual features such as eye blinking, yawning, and other physical changes. Methods based on biological changes such as decrease in heart and pulse rate. The critical issue that should be addressed, by a drowsiness detection system, is how early can it detect drowsiness and warn the driver to avoid accidents.

- A) The writer has put forward a technique which utilizes GPS and GSM to ascertain alcohol but this technique is very expensive, but the expenses can be cut off to a great extent. In this project a siren is being used which is highly economical, and can keep people in close proximity vigilant.
- B) Wearing smart helmet to prevent any mishap is suggested by writer which have certain deficiencies. Firstly, restrictions on the use of helmets to only 2wheelers. Secondly, microcontrollers are software based mega system in comparison to the economical siren that are open source hardware.
- C) Composite health monitoring and sensors based on infrared are utilized to ascertain alcohol as talked about by writer but the chance of false alarm can't be avoided in this system, because minute change in some situations can result in false alarm but in use of required technology makes it more authentic.
- D) To prevent the mishap of drunken driving writer have used PIC16F877A microcontroller which is an outdated system and expensive one also which restrains its use to only certain class of society whereas we are using Raspberry pi microcontroller which is advanced as well as economical.
- E) Worrying about the drunken driving the writer suggests the system to overcome the issue but using MQ2 alcohol sensor has come flames .MQ2 alcohol sensor is not authentic and raises the chance of false alarm while we have used MQ3 which is highly authentic.

III. METHODOLOGY

Block Diagram

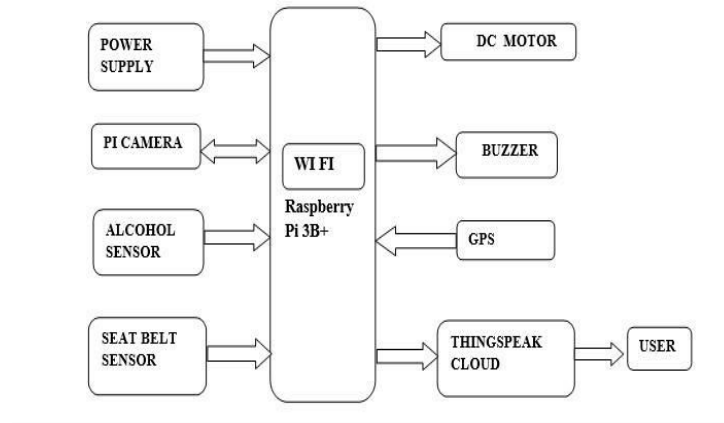


Fig.1.Block diagram of proposed system

In the proposed system, we use alcohol detecting sensor, pi camera, seatbelt sensor, GPS are the inputs and outputs are thing speak cloud, DC motor, buzzer. Raspberry pi will take the inputs and process it and gives the output. Pi camera detects the drowsiness using MAR, EAR & alcohol sensor detects the alcohol and seat belt sensor detects whether the person wears seat belt or not. If the driver detects to be drunk, drowsy, not wearing seat belt then raspberry pi will gives command to buzz the buzzer and stops the engine moto this can be shown in our device by using think speakcloud and also its coordinates using GPS.

Raspberry Pi:

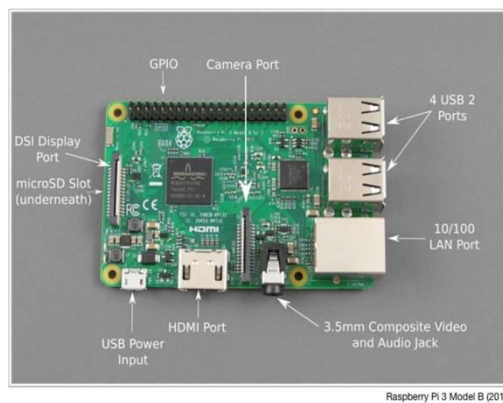


Fig.2.Raspberry Pi Pin diagram

Raspberry pi works well as a multi-processor. It has a graphics card, a volatile memory, RAM, device interfaces and other external wireless device interfaces. This raspberry Pi is consuming very less power, but it is still cheap and powerful. It requires a keyboard to provide commands, display unit and power supplies as a standard PC. Here, Raspberry Pi used the SD card as a hard disk. Raspberry Pi able to connect via a LAN / Ethernet or via a USB modem or via wireless. Raspberry Pi is supposed to support for various home and business applications. Raspberry Pi runs on a Linux-based OS and which operated by the Raspbian OS. Python is a programming language used to implement the Raspberry-Pi. It is capable of communicating with other external devices using wireless communication technologies, cellular networks, NFC, Zig Bee, Bluetooth etc. This paper was implemented on a fast network as 4G with the cellular network. Raspberry can be used for many applications and so, it has many opportunities in the future.

Pi Camera:



Fig.3.PI Camera Interfacing

The Raspberry Pi camera module can be used to take high-definition video, as well as stills photographs. It's easy to use for beginners, but has plenty to offer advanced users if you're looking to expand your knowledge. There are lots of examples online of people using it for time lapse, slow-motion and other video cleverness. You can also use the libraries we bundle with the camera to create effects.

Buzzer:



Fig.4 Pin configuration Buzzer

A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications. There are two types are buzzers that are commonly available. which when powered will make a Continuous Beweep sound, the other type is called areadymade buzzer which will look bulkier than this and will produce a Beep. Beep. Beep. Sound due to the internal oscillating circuit present inside it. But the one shown here is most widely used because it can be customized with help of other circuits to fit easily in our application.



Alcohol sensor:



Fig.5. Pin configuration Alcohol Sensor

MQ3 is one of the most commonly used sensors in the MQ sensor series. It is a Metal Oxide Semiconductor (MOS) type of sensor. Metal oxide sensors are also known as Chemo resistors, because sensing is based on the change of resistance of the sensing material when exposed to alcohol. So, by placing it in a simple voltage divider network, alcohol concentrations can be detected. MQ3 alcohol sensor works on 5V DC and draws around 800mW. It can detect Alcohol concentrations anywhere from 25 to 500 ppm. Operating voltage 5V Load resistance 200KΩ Heater resistance 33Ω ± 5% Heating consumption.

GPS:

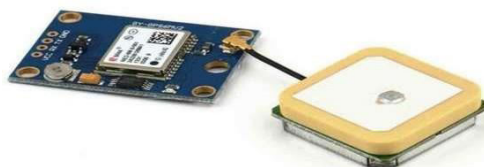


Fig.6. Pin configuration GPS

Global Positioning System is an earth-orbiting- satellite based system that provides signals available anywhere on or above the earth, twenty-four hours a day, which can be used to determine precise time and the position of a GPS receiver in three dimensions. GPS is increasingly used as an input for Geographic Information Systems particularly for precise positioning of geospatial data and the collection of data in the field. Precise positioning is possible using GPS receivers at reference locations providing corrections and relative positioning data for remote receivers. Time and frequency dissemination, based on the precise clocks on board the SVs and controlled by the monitor stations, is another, use for GPS. Astronomical observatories telecommunications facilities and laboratory standards can be set to precise time signals or controlled to accurate frequencies by special purpose GPS receivers.

IV. EXPERIMENTAL RESULTS

The results are shown below. This system is used to give the alert to the driver when he/she is feeling sleepy, intake of alcohol and not wearing seat belt and also run off the engine. The operation is processed by raspberry pi. If the engine is turned off then the authorized person get location through GPS of the vehicle.

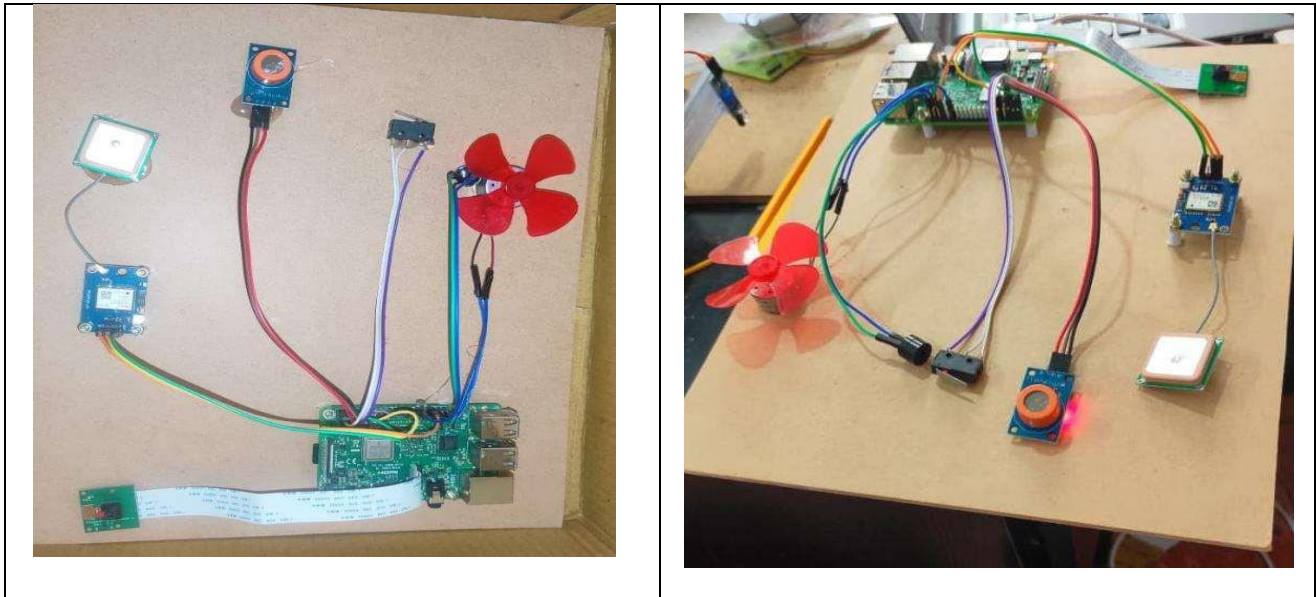


Fig.7.Final Module with Power Supply

When the power supply is given to the module then the pi camera, alcohol sensor, seatbelt sensor will activate and after running the code DC motor will run.

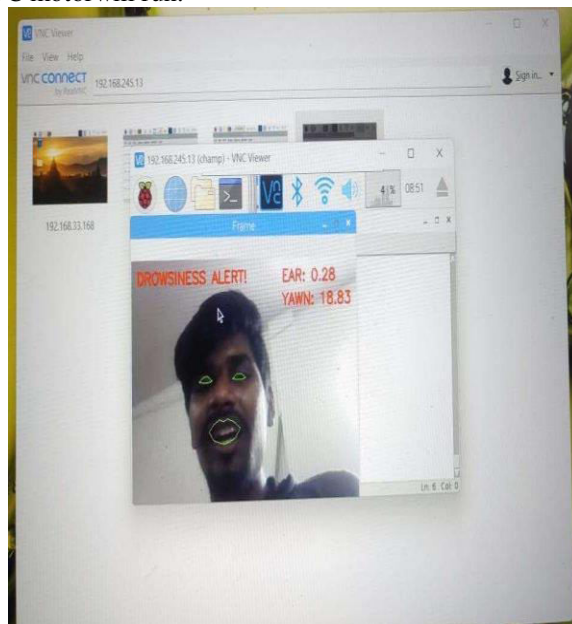
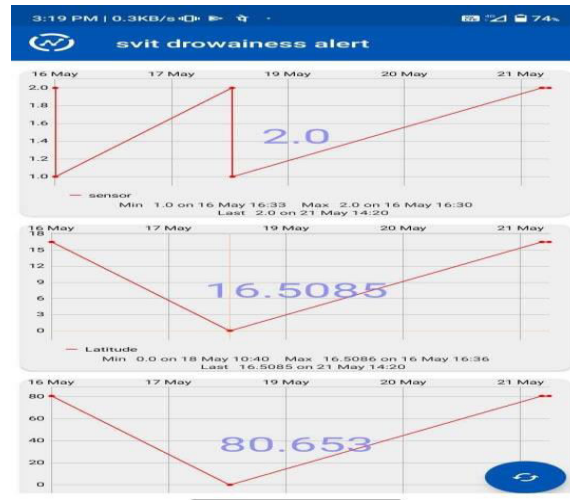


Fig.8 pi camera detecting drowsiness

As we can see in the above second figure when the power supply is given to the module then the raspberry pi will activate and operation is processed by raspberry pi. If the pi camera detects drowsiness like as shown in the figure above then it will send signal to the raspberry pi, then raspberry pi alert the driver by using buzzer and stops the engine. The information will be updated to the device of the authorized person as shown in figure the 2.0 indicates the person is drowsy.



V.

Fig.9. Drowsiness Alert and Location Info

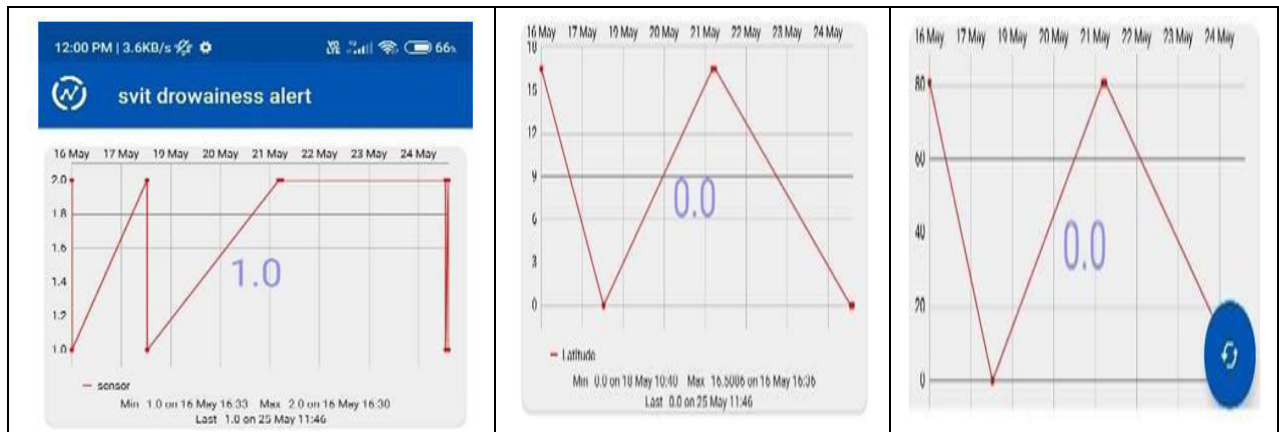


Fig.10 seat belt, alcohol alert and location info

The above figure shows the updated information of the authorized person when the person is not wearing the seat belt the 1.0 in the figure indicates that the person is not wearing seat belt. In the same way alcohol detection, when detected by alcohol sensor the information will be updated to the authorized person and it also has 1.0 number that indicates the driver is drunk.

VI. CONCLUSION

The driver drowsiness and alcohol detection system used to detect the drowsiness of the driver and also detects the alcohol consumption of driver. If there is drowsiness or consumption then the motor of the car gets slowed down and the buzzer sounds until the eyes get opened. The values of alcohol and the blink rate will be displayed in the serial monitor of the Raspberry. This proposed system helps in finding drowsiness and alcohol detection using Arduino. This helps in avoiding many accidents. Further we extend this project by using webcam to detect the drowsiness of the driver.

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